



## **SENTINEL MULTISERVICE SWITCH ROUTER MSR115**

The Sentinel Multiservice Switch Router (MSR115) is a versatile and reliable dual stack IPv4/IPv6 networking solution for military applications in tactical and mobile environments.

The MSR115 exploits all the benefits deriving from IP technology in terms of service convergence, system openness and upgrading capabilities. At the same time, it provides enhanced networking features with respect to optimized Quality of Service (QoS) for any different application or service, network mobility and resilience, system security.

### **STATE-OF-THE-ART PERFORMANCE**

The MSR115 combines outstanding throughput performance with innovative services and protocols support in an extremely scalable architecture. A wide range of interfaces is available to establish network connections over Ethernet and narrowband and wideband serial links.

In addition to standard IP protocols, additional networking solutions are introduced for faster topology convergence and graceful network performance degradation upon link failures or nodes disruption.

Along with standard DiffServ QoS policies, advanced bandwidth reservation mechanisms are implemented in support of mission critical applications (real time data). On the network interfaces, Forward Error Correction mechanisms can be run to meet high-grade link quality requirements in presence of Bit Error Rate (BER) up to  $10^{-3}$ . Network resilience and security are further guaranteed thanks to the distributed MSR115 architecture and redundant networking engine (optional), and the capability to support Multi-Level Security architectures.

The MSR115 is fully interoperable with Selex ES MPS switches.

## QUALITY OF SERVICE

The MSR115 provides a robust IP network solution capable of managing - at the same time - Connectionless (CL) Traffic and Connection Oriented (CO) Traffic.

The equipment is able to manage CL Traffic by means of a DiffServ paradigm, which allows prioritizing voice, video and data by using packet marking. Moreover, Policy Based Routing (PBR) provides a Provisioned QoS allowing the MSR115 to route the packets differently using policy rules.

As far as the Connection Oriented traffic is concerned, the equipment is able to guarantee a dynamic bandwidth allocation and the delivery of end-to-end QoS to the different data, voice and video applications with full support of military user services (priority, preemption, security, etc). End-to-end QoS is guaranteed during the whole connection time by means of Call Admission Control and traffic shaping/engineering capabilities purposely developed by Selex ES.

Up to 5 (classified) +1 (unclassified) security levels are provided on traffic flow basis and the equipment is able to route the traffic according to the pertinent security level. Upon link failures, the equipment provides automatic rerouting of current traffic flows through different (weighted) available paths. The allocation of the available systems resources is ruled concurrently by security, priority and traffic contract policies.

The capability to provide military QoS can be fully exploited when MSR115 is deployed in conjunction with the other Selex ES Sentinel equipment family (Sentinel IPCS115, Sentinel MSIP115, Sentinel VoIP phone).

## ROUTING PROTOCOLS

The MSR115 supports all relevant standard routing protocols, such as OSPF and BGP, in line with typical user requirements.

What makes the MSR115 tailorable to military and mission critical applications is its ability to manage Advanced Flood Search routing, offering an extremely rapid convergence time in case of link lost. Policy Based Routing (PBR) and GRE tunneling complete the offer for advanced features.

## INTEGRATED SERVICES

The MSR115 is able to work on demand as Integrated Service Router, performing Voice over IP (VoIP) processing, providing legacy user accesses and assuring interworking functionalities towards legacy networks and users supporting civilian such as military communication protocols.

Thanks to its capability to integrate Sentinel Multi Service Interoperability Point MSIP115 functionalities, MSR115 is able to fully interoperate with the CD1xx family tactical switches and to provide complete support to EUROCOM, STANAG, ITU-T and ETSI standards.

Moreover, MSR115, via embedded Sentinel IP Calling Suite IPCS115 application software, is able to provide civilian and military VoIP services in accordance with H.323 and SIP standards.

VoIP military extensions, such as management of precedence and pre-emption, PTT signalling, self-affiliation and self-deaffiliation of users, nomadic users management, digital conference, non secure warning tone, make MSR115 suitable to meet military VoIP needs in both tactical and mobile scenarios.

## TECHNICAL SPECIFICATIONS

The MSR115 provides one slot for network processing unit and up to five expansion slots in a compact rugged chassis available in two different form factors: 1 rack unit and 3 rack units. The expansion slots can accommodate a wide range of different network and user access interfaces or a redundant routing engine. The product is designed to meet stringent mechanical, environmental and electromagnetic stresses in accordance with the applicable MIL-STD specifications.

## IP INTERWORKING

- OSPFv2
- BGPv4
- GRE Tunneling
- PIMv2-SM
- IGMPv2

## ADVANCED ROUTING

- Advanced Flood Search routing
- Classical Flood Search routing
- Areas Bounded Flood Search routing
- Policy Based Routing

## REDUNDANCY

- Fault Tolerant architecture
- VRRP

## SECURITY

- Firewalling through Access Control Lists
- Up to 5+1 security domains for traffic flows

## QOS

- DiffServ and QoS E2E
- Connection-oriented flows, traffic shaping, advanced scheduling
- Robust header compression
- Link Fragmentation Interleaving (LFI) and proprietary Fragmentation Mechanism

## NETWORK SERVICES

- DHCP
- IPv6 Stateless Router Autoconfiguration Advertisement
- Proxy ARP
- Network Synchronization

## LAYER 2 FEATURES

- Transparent bridging
- MAC learning, aging and switching by hardware
- VLAN according to IEEE 802.1q
- Rapid Spanning Tree Protocol according to IEEE 802.1w
- InterVLAN routing

## INTEGRATED SERVICE FEATURES

- Standard and military basic and supplementary VoIP
- Services, supporting H.323 and SIPv2
- Telephonic addressing formats according to standard and military numbering plans:
  - ITU-T E.164
  - STANAG 4214 Ed. 1 and Ed. 2
  - STANAG 5046
- Support of a wide set of voice codings:
  - G.711 A and u-law
  - G.726 ADPCM16 and ADPCM32
  - CVSD16 and CVSD32, G.729.1 CELP 8kbps, G.165 echo canceller
- Interoperability with legacy user/network equipment such as Selex ES CD switches, ISDN PABX, ISDN and EUROCOM/STANAG Gateways

## INTERFACES

### Tactical management routing engine card:

- Usable in MSR115 3U
- 1 x RS232 serial interface for management
- 1 x 10/100 Base T Ethernet interface for management redundancy capability provided of packet processor with 64 Gbps non blocking switching capability

### Tactical management routing engine (mre-1u) card:

- Usable in MSR115 1U equipment
- 1 x RS232 serial interface for management
- 1 x 10/100 Base T Ethernet interface for management
- 2 x 1000 Base Lx or Sx Ethernet LAN/WAN interfaces
- 2 x 10/100/1000 Base T autosensing Ethernet LAN/WAN interfaces provided of packet processor with 12 Gbps non blocking switching capability

### Tactical Ip5GigaOPT-BT card:

- 2 x 1000 Base Lx or Sx Ethernet LAN/WAN interfaces with L2/L3 switch functionality embedded
- 3 x 10/100/1000 Base T autosensing Ethernet LAN/WAN interfaces with L2/L3 switch functionality embedded

### Tactical IP4GigaBT card:

- 4 x 10/100/1000 Base T autosensing Ethernet LAN/WAN interfaces

### Tactical IP4GigaOPT card:

- 4 x 1000 Base Lx Ethernet LAN/WAN interfaces

### Tactical IP4GigaBT-PoE card:

- 4 x 10/100/1000 Base T autosensing Ethernet LAN/WAN interfaces able to supply Power over Ethernet

### Tactical IP4GigaBT-48V card:

- 4 x 10/100/1000 Base T autosensing Ethernet LAN/WAN interfaces
- 1 x DC48V input power connector, providing power supply redundancy support to MSR115 3U and 1U equipment

### Tactical ATM155OPT card:

- 4 x ATM STM-1 optical interfaces

### Tactical MR FEC card:

- 3 x Synchronous/Asynchronous serial interfaces based on ATM technology individually configurable as:
  - Up to 2 Mbps IAW ITU-T V.11/V.35
  - Up to 128 kbps IAW ITU-T V.28
  - 2/8/34 Mbps IAW ITU-T G.703 (coaxial)
- Forward Error Correction capability individually activable
- Proprietary fragmentation mechanism

### Tactical MR FEC-HSSI card:

- 3 x High Speed Serial interfaces individually configurable as DTE interfaces with bit rate from 64 Kbps up to 52 Mbps, IAW HSSI
- Forward Error Correction capability individually activable
- proprietary fragmentation mechanism

## INTEGRATED SERVICE INTERFACES

### Tactical ISDNE1T1 card:

- 4 x ISDN E1/T1 interfaces configurable in transparent mode or signalling mode

### Tactical EUROCOM card:

- 4 x EUROCOM AMI/HDB3 interfaces configurable with different electrical interfaces (EUROCOM A, G.703, STANAG 4210) and bit rate (from 256 kbps up to 2 Mbps), and supporting the following signalling protocols:
  - SELEX Eurocom Trunk
  - STANAG 4206

### Tactical ADSM card:

- Dedicated platform to provide support to services based on point-to-multipoint calls (conferences, broadcast, call recording)
- Dedicated hardware devices to mix conferees voice flows and carry out transcoding functions

## MANAGEMENT

- Auto-diagnostic:
  - Power-on self-test
  - General Alarm
- Local Terminal:
  - RS232 asynchronous serial line with ASCII protocol
- NMS Control through an Ethernet 10/100 Base T:
  - SNMPv3 protocol
  - Telnet protocol
  - Configuration files via XML
  - TFTP saving and restoring configuration



## MAIN SUPPORTED STANDARDS

- IPv4 (RFC 791)
- ICMP (RFC 792)
- GRE tunneling protocol for IPv4 (RFC 2784)
- IGMPv1,v2 for IPv4 (RFC 2236)
- User Datagram Protocol (RFC 768)
- IP over Ethernet (RFC 894)
- TCP (RFC 793)
- ARP (RFC 826)
- Proxy ARP for IPv4 (RFC 1027)
- DHCPv4 (RFC 2131)
- IPv6 (RFC 2460)
- IPv4-IPv6 dual stack (RFC 4213)
- ICMPv6 (RFC 2463)
- Neighbor Discovery for IPv6 (RFC 2461)
- IPv6 Stateless Autoconfiguration Router Advertisement (RFC 4861)
- OSPFv2 (RFC 2328)
- BGPv4 (RFC 4271)
- Graceful OSPF Restart (RFC 3623 )
- Graceful Restart Mechanism for BGP (RFC 4724)
- PIMv2 Sparse Mode for IPv4 (RFC 2362)
- Session Description Protocol (SDP) (RFC 2327, RFC 3264)
- Session Initiation Protocol (SIP) (RFC 3261)
- The SIP INFO Method (RFC 2976)
- Real-Time Transport Protocol (RTP) (RFC 1889, RFC 2833, RFC 3550)
- H.323
- ETSI ETSI 300 102-1, 125
- Q.Sig ETSI 300 172-1/2, 3
- E.164
- ATM Forum UNI 3.1
- ATM Forum UNI 4.0
- EUROCOM D/1
- Stanag 4578
- Stanag 4214
- Stanag 5046
- Stanag 4206
- ECMA-143
- TaclSDN
- VRRP (RFC 3768)
- VLAN Tagging (IEEE 802.1q)
- Rapid Spanning Tree Protocol (IEEE 802.1w)

- A Simple Network Management Protocol (SNMP) (RFC 1157)
- Structure of Management Information for SNMPv2 (RFC 1442)
- SNMPv3 Applications (RFC 2263)
- SNMP Applications (RFC 2573)
- Management Information Base for Version 2 of the Simple Network Management Protocol (SNMPv2) (RFC 1907)
- Telnet (RFC 854)
- TFTP (RFC 783)

## POWER SUPPLY

- DC Source:
  - Voltage: 24 (\*) or 48 VDC
  - Consumption: Max.40 W per card
- AC Source:
  - Voltage: 110/220 VAC, 50/60 Hz (\*)
  - Consumption: Max.55 VA per card
- Note 1: AC/DC with no break automatic changeover (\*)
- Note 2: (\*) with an external power supply unit

## PHYSICAL

- Size:
  - 64 x 491 x 477 mm. (H x W x D)
  - 153 x 491 x 477 mm. (H x W x D)
- Weight:
  - up to 10 kg in minimal configuration
  - up to 45 kg in maximal configuration

## ENVIRONMENTAL

- According to MIL-STD-810F
- Operating Temperature: -40 °C ÷ +55 °C
- Humidity: 95% non condensing

## EMI/EMC

- According to MIL-STD-461E
- CE: Electromagnetic Compatibility according to ETSI 300-386
- CE: Safety according to CEI EN 60950-1

## INSTALLATION

- 19" racks
- Fixed, shelter, vehicle, field use